Frankly Speaking

Traffic Engineering in War and Peace

IT WAS just two months before our entry into World War II that the Institute of Traffic Engineers announced its program for War Production Transport—a program including staggered working hours, route planning, and elimination of bottlenecks. Since that time nearly all efforts in highway transportation have been directed along these lines.

A year ago the Institute received a grant of money from Yale University, made possible by the Eno Foundation, and it was decided to appraise the work being done by representative war industries in the transportation of their workers. This report has just been published. One outstanding fact is that where communities have conformed generally to the principles outlined in the War Production Transport Plan, they are meeting their transportation problems satisfactorily. Certain conclusions can be drawn from the report which point the way for needs in employee transportation after the war. They are:

1. A continuation, in modified form, of staggered working hour plans for the more efficient use of mass carriers and relief of congestion at plant entrances.
2. Construction of modern, adequate highway facilities in urban areas.
3. Construction or improvement of off-street parking facilities.
4. More efficient and safer use of present street facilities through modern traffic engineering.

As we draw nearer to the cessation of hostilities, we must double our efforts to be ready for the impact that post-war conditions will have on the transport service. At the Fourteenth Annual Meeting, the members of the Institute must re-appraise their objectives in the light of the immediate post-war needs so that the highway user will be assured a full measure of efficiency, safety, and convenience in the movement of persons and goods. These objectives should include (1) the elimination of wasteful congestion, particularly in urban areas; (2) the reduction of vehicular and pedestrian accidents on streets and highways; (3) adequate technical training for traffic engineers; and (4) the coordination of highway traffic plans with overall planning, design, and related means of travel.

We must not only remain alert to our responsibilities, but we must broaden our viewpoint and objectives so that we may be of greater usefulness and value to our community, state, and country.

As I come to the close of my term of office, I want to express my very real appreciation to all of the members of the Institute who have so generously given of their time on committee work, in conferences, and in personal advice. During these war years, time has been at a premium and it is this willingness to give a little extra that has made the Institute the growing, vital organization it is.

D. Grant Mickle

President.

CONVENTION OFFERS DIGNITARIES AND INDIGNITIES

TRAFFIC and transportation as a vital part of modern American life—THAT is the keynote of the 1943 Convention with emphasis on the importance of close collaboration and cooperation with professional men in related fields. Technical papers on research in specialized subjects are conspicuously missing from the program. In their places are talks by qualified speakers to give those who will attend a broader concept and deeper appreciation of the opportunities and responsibilities of their jobs.

All major fields related to traffic engineering cannot be covered during one convention, of course, but City Planning has earned a prominent part in the program. Both morning and afternoon sessions on Monday, October 4, will be co-sponsored by the Chicago Plan Commission. The speakers include prominent planning authorities in city, state and industrial fields. Integration of traffic and transportation plans with planning of housing, factories and recreational facilities will bring traffic engineers and city planners together on common ground.

Sessions on Tuesday continue the general theme of closer professional relationships. Economics, a foreign word to most engineers, will be applied to the not-so-foreign subject of highway transportation. Another speaker will discuss parking terminals, still largely a private industry in which traffic engineers have had little influence. An army officer with recent experience in the theatre of operation will tell how the numerous I.T.E. members and their fellow officers in the Army Transportation Corps are doing a magnificent job under difficulties of which enemy action is only one. The day sessions will close with a panel of well informed specialists assembled to answer questions submitted in advance by mail, or from the floor. There will also be an evening session on Tuesday, with the Transit, Commercial Vehicle, and Street and Highway Traffic Sections of the National Safety Council. The subject is most timely: "Women in Transportation".

From the Sublime

Carrying a good idea too far, the Resolutions Committee will hold a joint session in confusion and consternation with the O. P-U at the Biscuit Banter Breakfast on Monday morning. Anything can happen, and probably will. There will be no Banquet this year, but there will be plenty of ham and corn at the Breakfast. Because of the vegetable shortage, the ITE-BIT-TIE PLAYERS have become bold enough to again make a final farewell appearance. It is rumored that rehearsals may start as early as Sunday, October 3, if a skit has been found by that time.

Institute Headquarters will be on the third floor of the Hotel Sherman in THE BULLFIGHT ROOM. The management has agreed that during the I.T.E. Convention the name shall be shortened to just plain BULL.

Members are urged to arrive in time for the committee meetings on Sunday morning, October 3, and the Annual Business Meeting that afternoon.

THE COLUMBUS, OHIO, SEMINAR ON MAINTAINING AUTOMOBILE TRANSPORTATION

In Columbus during the week of June 28 to July 2 the American Automobile was "put on the spot" with just as searching and unbiased an investigation as was ever conducted by a grand jury on the biggest of cases. In this case the jury was a group of 41 leading traffic authorities from many sections of the country, and the "witnesses" were 16 specialists in motor transportation, each appearing before the group for a day or two, supplying the necessary facts and authoritative information.

The Seminar set out to determine weaknesses in existing automobile transportation programs to devise ways to overcome these weak points, and to consider means of meeting the growing threats to the automobile brought about by war shortages in manpower and materials.

At the conclusion of the five-day conference, the participants voted their approval of an 11-page report and recommendations, and appointed a drafting and steering committee, headed by Seminar Director Harold F. Hammond, to put the report in final shape and carry forth the various phases of action determined upon. The first phase decided upon involved recommendations to certain governmental agencies; and since these recommendations are now being studied by Washington officials, they cannot be revealed at the present time.

The other phase of the plan of action involves securing the support of leading national traffic and transportation organizations in support of the Seminar's program designed to lengthen the effective life of the nation's automobiles. Announcement of this program is expected to be made shortly.

At the beginning of the Seminar, discussion centered on the various factors which are accentuating the problem of maintaining automobiles in efficient operating condition. These factors are as follows:

The Increasing Scrappage of Automobiles. There were 1,000,000 vehicles scrapped in 1942, 1,500,000 will be scrapped in 1943, and 2,000,000 in 1944 (Office of Defense Transportation estimates). This increasing rate of scrappage means two things: that the number of automobiles in operation will steadily decrease, and that those still remaining will be more difficult to keep in operation as time goes by.

Instead of having approximately 3,750,000 new passenger cars to draw from annually, as in 1940 and 1941, the pool of 520,000 unsold new cars, "frozen" at the start of 1942, will be gone some time late in 1943. The release of this small pool of 520,000 new cars cannot possibly be expected to replace the 2,500,000 junked in 1942 and '43. Furthermore, there will be no new cars to replace the 2,000,000 scrapped in 1944, to say nothing of those junked after that.

It is interesting to note that since Pearl Harbor the yearly percentage of total cars scrapped fell from around 9 per cent to below 4 per cent. This is only natural, in view of the inability to purchase replacement cars and the corresponding necessity of maintaining in operation vehicles which would otherwise be scrapped.

However, the differential between the larger and smaller scrappage figures represents a fleet of 1,250,000 automobiles that would have been scrapped in 1942, under ordinary conditions. These vehicles are, in a sense, "living on borrowed time." They, and the similar groups in 1943

and succeeding years, can be kept operating through careful operation and maintenance.

The Increasing Average Age of Automobiles. The average age of employee cars is 7 years, according to a survey of 94 war plants in 10 states made by the Public Roads Administration. The survey showed 57 per cent to be 7 years of age or older. In half the industrial areas surveyed, 20 to 30 per cent of cars serving war plants are 10 years old and over.

Older vehicles are more apt to experience mechanical failures and breakdowns resulting in lateness and absence of employees. Aside from actual breakdowns, the greater amount of necessary maintenance and repair work may cause the employee-owner to be late or absent from his work while attending to the details of the work on his car. His passengers will be similarly affected.

Considerable difficulty will be encountered in maintaining the one-quarter of all passenger cars which will reach ten years of age during 1943.

The Inequitable Distribution of Automobile Ownership. Those living in the metropolitan areas, especially among the professional and non-labor groups, generally own the better cars. Also it is among these groups that we find the families owning two or three cars. On the other hand, war plant employees possess the older cars, upon which they depend to a greater extent for their transportation, and which they operate over more miles on the average.

Surveys have shown that at outlying war plants, the majority of the workers rely upon the passenger car, while their urban cousins although owning the better vehicles, rely on transit facilities for over half of their travel. Thus, the better cars are in the hands of those who need them the least.

The Shortage of Skilled Automobile Mechanics. As more of these men are drawn into war industries and into the Armed Forces, this shortage will become more acute and far reaching in its effect. In the face of increasing needs for prompt repairing and servicing of vehicles the decreasing manpower to perform this work constitutes a serious problem.

More than nine out of ten automobile mechanics quit their jobs during 1942 in the Northeast and Central Atlantic states, according to a survey by General Motors among 1,853 dealers with an average monthly mechanic employment of 8,979. Even including replacements, many of whom were not as skilled as the quitting mechanics, there was a decrease of mechanic employment of about 50 per cent during 1942 among 2,299 dealers employing 14,025 mechanics on January 1, 1942.

A survey by the American Automobile Association in 31 states of 6,241 garages now employing over 27,000 men revealed a net loss of 40 per cent in mechanics during 1942. In the face of this reduction in manpower, these establishments were called upon to handle practically as much work as they did in 1941, but had to refuse a volume of work equal to 70 per cent of that handled in 1941.

The Shortage of Replacement Parts. The shortage of certain replacement parts is already acute in some areas. The situation with respect to older cars can only become more serious in the future as efforts are made to keep these cars operating in spite of greater wear.

Certain functional parts which can only be used on car models ten years old or over are not being manufactured, and to a lesser extent this is true for cars seven years of age and older. These facts have a serious significance when it is recalled that cars ten years old or older are owned pre-

dominantly by war workers and farmers who operate in the higher mileage brackets.

Neglect and Deterioration of Infrequently Used Vehicles. These relatively idle vehicles are suffering because of non-use. Batteries and mufflers are particularly hard-hit.

A Small Group of Cars Travel the Most. A major portion of the total mileage traveled is now confined to that smaller percentage of cars represented by "B" and "C" ration holders. For instance, a sample survey conducted by the Office of Price Administration in the Spring of 1943, showed that 2,000,000 vehicles with high "C" cards are responsible for approximately the same amount of travel as 13,700,000 automobiles with "A' cards. "B" and "C" card holders, operating 44 per cent of all cars, were shown to be responsible for 71 per cent of total mileage rations.

A Larger Percentage of "Stop-and-Go" Urban Driving. This fact, due to elimination of the longer trips and pleasure jaunts, increases the rate of vehicle wear.

Excessive Vehicle Wear Due to Poorly Maintained Highways. Shortages of manpower, equipment, and materials, have led to lowered standards of roadway maintenance, and actual neglect in some cases, causing undue automobile wear and tear.

One of the fundamental conclusions reached by the Seminar was that transportation policies should make adequate provision for maintenance of two types of automobile transportation which are essential to the war effort.

(a) That serving military establishments, farms and war plants.

(b) That necessary to family life, the functioning of community services, and support of the civilian economy, whether the travel is for occupational or non-occupational purposes.

The importance of educating car owners on the vital need for and proper methods of automobile maintenance emerged from the Seminar as another fundamental consideration. A confused conception apparently exists in the private vehicle owner's mind as to the necessity for conserving and maintaining his car because of conflicting, untimely, and unfortunate statements emanating from responsible governmental agencies and officials.

The Seminar concluded that both government and industry should interest themselves to a much greater degree in providing competent, practical and understandable information with respect to car care, preventive maintenance and improved driving habits.

It was concluded that ration boards, plant transportation committees and car owners should be educated on the full reasons for mileage rationing, group riding and other related conservation measures—that these measures are aimed at prolonging the life of the vehicle as a unit of essential transportation rather than because of any other single reason, such as a gasoline or tire shortage.

Accidents Send Thousands of Autos to the Junk Yards Each Year. The manner in which automobiles are operated is an important factor in determining how long they can be continued in effective use.

Proper driving habits prevent the loss of vital manpower, vehicles and materials resulting from traffic accidents. In 1942 traffic accidents claimed 18,500 war workers' lives, and injured approximately 650,000 more, according to the National Safety Council. This is a tremendous drain on the nation's manpower resources, in addition to sending thousands of employees' vehicles to the junk pile. Likewise, accidents resulting from careless driving send millions of vehicles each year to the garages for repairs, thus con-

suming scarce materials and manpower.

The Seminar agreed that programs to enlist the cooperation of motorists in this regard, and to provide for adequate training of new drivers and for the efficient administration of regulatory control over vehicle use are necessary to ensure effective results in this field of conservation.

Automobiles Must Continue to Carry the Major Load. Evidence presented made it clear that while public transportation is carrying tremendous loads, it cannot be counted upon to absorb any appreciable part of the load now carried by privately owned cars.

The family car is by far the biggest factor in the necessary daily travel of the American people and is an integral part of our existing community, social, and economic structure. Car-use studies reported in 1941 showed that 77 per cent of all trips in peace-time were for necessary purposes—to and from work, to school or church, or on business trips. With the war-time curtailment of unnecessary driving, this percentage is nearer 100 per cent today.

The majority of war workers use private cars to go to and from the job. Although it is estimated that upwards of 60 per cent of the nation's workers rely on the automobile, in many cases outlying war plants are almost completely dependent upon private transportation. This is illustrated by the findings of a Public Roads Administration survey in 1942 of 94 war plants in 10 states, which revealed that 73 per cent of the employees relied on private cars to get to and from the job. Informed opinions indicate that by further practicable staggering of working and school hours, and economies in operation and other adjustments, public transportation could accommodate only 15 to 20 per cent additional traffic. Therefore, public transit, already carrying a tremendous load, should not be counted upon to absorb any appreciable share of the existing load carried by private passenger cars.

In a large number of small cities and towns the populations are entirely dependent on the passenger car for local transportation.

Many Fingers in the Automotive Pie. The Seminar gave much consideration to the problems of supply and distribution of manpower, vehicles, replacement parts, tires, petroleum products and repair service equipment. It was brought out in the discussion that these problems are affected by functions exercised by the following agencies:

Office of Defense Transportation
Office of Price Administration
Office of Petroleum Administration for War
Office of the Rubber Director
Selective Service
Transportation Corps of the Army
United States Employment Service
War Labor Board
War Manpower Commission
War Production Board

It was the opinion of the Seminar that substantial and encouraging progress has been achieved recently in coordinating the efforts of these agencies through the Office of Defense Transportation, which has been assigned that responsibility.

Evidence was presented, however, that widespread confusion of authority and overlapping of effort exists in the states and communities with respect to many of these problems. It was brought out that there is urgent need for centralization or coordination of this authority.

A majority accepted the idea that inasmuch as ODT has been assigned the responsibility by executive order of formulating policies governing passenger transportation, that ODT should deal more actively with passenger car transportation.

Group Riding. Within certain limits, which experience is defining, group riding offers an effective means whereby vehicles, parts, tires and petroleum can be conserved to meet war transportation needs.

The car occupancy rate for the country as a whole was 2.0 persons per car before Pearl Harbor, indicating that the practice of group riding is not entirely a phenomenon of war. The increase of this rate to 2.3 at present is due in large measure to organized car sharing programs among war production employees, and particularly in large outlying plants, as brought out in discussion by the Seminar. The reason for this success was pointed out as follows: Group riding requires certain adjustments to group convenience. To the extent that those who depend upon motor transportation live in a reasonably concentrated area and have their place of employment together, at similar hours, the adjustments are minimized and group riding is more easily promoted and sustained.

The Seminar agreed that, to the extent these conditions do not exist, the adjustments are more difficult and group riding is discouraged; that changes in working hours impose obstacles; that organized car sharing arrangements are much more difficult in sparsely populated areas than among those close together.

Evidence presented made it clear that many of the adjustments necessary for group riding can be overcome by the exercise of ingenuity and by the willingness of individuals to accept minor sacrifices which the practice calls for; the question of public attitude thus coming into the picture.

One major point upon which there was complete accord was that confusion and uncertainty arising from conflicting or incomplete statements regarding the rubber, gasoline and passenger car problems have tended to obscure the need for group riding, and have interfered seriously with the program.

It was pointed out that the lack of adequate administrative organization, the failure to provide adequate incentives and the lack of understanding on the part of the motorists as to the full reasons why they should engage in group riding have largely contributed to the present failure to approach more nearly the full possibilities of car conservation through group riding, in spite of efforts made to apply pressure for group riding through gasoline rationing regulations.

ON THE SHELF

Passenger Transport—published weekly by the American Transit Association, 292 Madison Avenue, New York, N. Y., is a newcomer to the local transportation field and is highly recommended for those interested in general transit problems. Subscription price $3.50 per year.

Bibliography on Highway Transportation in Wartime, compiled by Automotive Safety Foundation, Tower Building, Washington, D. C. This list of selected films, articles and pamphlets covers conservation, training, roadways, safety surveys, etc. 23 pages.

Proceedings of the Twenty-ninth Annual Michigan Highway Conference, Ann Arbor, Michigan, Feb. 1943. The proceedings contains papers on railroad crossing protection; wartime traffic problems; maintenance of highways and new highway construction. 100 pages.

Connecticut Roads by the Bureau of Highway Planning Studies of the Connecticut State Highway Department, Hartford, Conn. A report setting forth graphically highway conditions and the problems they present to the Connecticut public. Jan. 1943; 44 pages; charts, photos.

POST-WAR TRAFFIC WORK CONFERENCE YALE TRAFFIC BUREAU REPORT

A FOUR DAY work conference, beginning August 23rd, held by the Bureau for Street Traffic Research and the Institute of Traffic Engineers, at Yale University, developed considerations for traffic engineering in the post-war era and also sound policies dealing with training of traffic engineers. A resumé of the thinking at this work conference is set forth below and comments concerning it are urged from all practicing traffic engineers. Such comments should be forwarded to the Bureau for Street Traffic Research, Yale University, New Haven, Connecticut.

Those present at the conference presented a wide diversity of viewpoint and scope of interest. Attending were:

Hawley Simpson, Lawrence S. Waterbury, Harold F. Hammond, D. Grant Mickle, Donald Berry, Paul Green, Graham Cole, Maxwell Halsey, Harry Hough, I. S. Shattuck, Charles Prisk, Wilbur Smith, Dwight McCracken, Stuart Hawley, Ted Matson, Charles Upham, Jr.

Concept of Traffic Engineering. It was generally agreed that there are no rigid boundaries which will segregate traffic engineering from highway transportation and it was also agreed that in many areas the basic thinking has been too narrow and stifling. Too much emphasis has been given to and too much effort expended on matters of signs, signals, markings, and regulations. Not enough attention has been given by traffic engineers to the over-all values learned from studies of highway operations. Accordingly, the application of traffic engineering in highway design and planning has not advanced as much as desired. The evaluation of highway operations and the interpretation of such operations to the public generally and more particularly to the professional men in collateral fields should be rapidly advanced. Throughout the conference, it was continually stressed that the traffic engineer should strive for rendition of greater technical service to his community and professional associates. To this end, he must continue to search for fuller knowledge of traffic operation and the application of this knowledge to the solutions of highway operation problems.

Contact with Collateral Fields. Examination of matters of mutual concern to traffic engineers and those in closely allied fields lead to the conclusion that the traffic engineering profession should seek to understand better the problems, objectives, and solutions of those engaged in the several allied fields which affect the traffic operations of finished structures and in turn have understood traffic engineering problems, objectives, and solutions by those working in the allied fields.

The following organs are important in post-war developments:

Planning

American Institute of Planners
American Society of Planning Officials
American Planning and Civic Association
Local, County and State planning agencies

Architects

American Institute of Architects
American Society of Landscape Architects

Housing

National, State and local agencies
State Highway and transportation agencies
American Association of State Highway Officials
American Association of Motor Vehicle Administrators

Public Utilities Commissions
State and City Police in I. A. C. P.

It was concluded that the individual traffic engineer as well as the Institute of Traffic Engineers could accomplish much in the way of improved mutual understanding and association by working with the above groups and the many public and civic municipal planning agencies. The exchange of ideas and experiences on traffic problems and structures individually and collectively, with these groups should be encouraged. Personal contacts, prepared articles, papers, and speeches would be helpful in developing mutual understanding.

Those present at the conference, accordingly, took action with respect to particularly opportune conditions. A resolution was adopted as follows:

"The prospect of urban and suburban development in the post-war era requires a fuller understanding of the mutual problems of planners and traffic engineers. Accordingly, it is proposed that a joint committee of the Institute of Traffic Engineers and the American Society of Planning Officials should be created to develop full, mutual understanding by the two groups with respect to highway traffic problems."

A sub-committee, Messrs. Marsh, Mickle, and Simpson, prepared an outline of material which is to be submitted by Mr. Mickle for consideration by the American Municipal Association in connection with a series of post-war seminars now being formulated by this association.

It was further suggested, that it would be desirable if a policy of traffic engineering functions and procedures could be developed jointly with the American Association of State Highway Officials.

Post-War Considerations Developed

Considerations of post-war traffic engineering problems and activities, developed by the conference, are submitted below for consideration by members of the Institute of Traffic Engineers:

Problems

More vehicle miles of highway travel
Changing land utilization in communities
Old vehicles in poor condition and new vehicles of improved design
Lack of terminals and parking facilities
Expansion of transport facilities
Increased emphasis on time values of travel
Inadequate street facilities

Objectives

The achievement of the following objectives should assure efficiency, safety and convenience in the movement of persons and goods:

1. "Degest" urban centers and other critical locations by means of speedier and steadier flow
   Attractive and convenient parking
   Through motorways for through traffic
   Reduction of conflicts between commercial and other traffic
   "Accident-proof" streets and highways for vehicles and pedestrians
2. Coordinate highway traffic plans and operation with highway planning and design
   Related means of travel such as air, rail, transit, etc.
   Master Plans for community development

Project Principles

A. Major construction projects
   Post-war Public Works construction plans should fit new roadway layouts to anticipated type and volume of traffic use.
   All new projects should fit into a street and highway plan for the entire area.
   Roadways, four lanes or more in width, should be divided.

Streets should be widened only where intersections are infrequent and where the additional lanes for moving traffic are provided.

Sidewalks and other facilities for pedestrian protection should be built as part of the street systems of urban and suburban areas.

New roadways should be designed so as to provide the modern traffic operation even by sacrificing some length of road built.

Off-street parking facilities should be provided, along main arteries to make possible the elimination of parking from congested roadways.

Modernize traffic control devices to provide for greater uniformity and flexibility of operation.

Establish one-way street systems to relieve congestion on existing streets.

Prohibit left turns on major two-way streets.

Protect pedestrians by separation of foot and wheel traffic through physical design such as, refuge islands, barricades, grade separations, and regulatory measures.

Base decisions on factual investigation by competent traffic authorities to be sure that they are fitted to actual traffic needs.

Traffic Engineering Training

The training of men in preparation for applied fields of traffic engineering was recognized by those present as being a very important phase of traffic engineering work in the post-war era in order to supply the need for trained men in this field. Every effort should be made now to plan training programs so that modern training may be activated at the earliest practicable time.

A review of the need for training developed that the greatest requirements are to be found in the various state and local governmental agencies. A slowly increasing demand for adequately trained traffic engineers is manifest in various national associations, and in insurance, transit, trucking, railway and aviation companies. This demand includes all grades of traffic engineering personnel from junior assistants to department heads. There is already an anticipated shortage of several hundred properly trained and experienced men.

It was felt by the conference group that many men, trained and experienced in traffic engineering work now in the armed services, may not return to traffic engineering work. This expected loss of personnel will create a serious replacement problem.

College training programs have been affected so that the number of undergraduate students, a normal percentage of whom would seek opportunities in highway work, will be seriously reduced in number for the duration of the war and for the immediate years after the war.

On the other hand, many men now with the armed services or who because of the war have been placed in diverse phases of transportation work, may become interested in traffic engineering work upon cessation of hostilities. More specifically men now serving with the Transportation Corps and similar agencies of the armed services, with the O. D. T. or H. T. A. C. may wish to remain in highway traffic work.

The conference agreed that there was need for several types of training work so that opportunities to receive training in traffic engineering matters were available to undergraduates, graduates, and in-service groups.

Undergraduate Training. The tendency for universities to abandon detailed, specific instruction in special work during the undergraduate training period, and to give increasing attention to the types of mental disciplines which cut through all fields of activity was noted. Hence, the con-

clusion was drawn that it is becoming more difficult to develop courses in transportation and traffic work during the undergraduate period. At the universities where such detailed course material is satisfactorily accepted for undergraduate training, it is, of course, desirable to get full consideration and adoption of traffic engineering training.

Graduate Training. Training at the graduate level was urged at the earliest time so that enough proper students can be obtained.[1] Prerequisite to such training would be a degree from an accredited university in either engineering or economics; or the equivalent experience in practice.

It was agreed that in all but a few exceptional cases not more than one academic year was practicable for such work because of student viewpoint and limitation. This limitation at once prevents graduate degrees for such work because universities generally require knowledge in other fields than those so closely associated with traffic work. For example—it is almost universally required by all universities that students shall have reading knowledge of some foreign language before he can be considered for graduate degree. Hence, it was concluded that university credit was desirable for training in traffic engineering but because of time and subject limitations, graduate degrees for traffic engineering are not possible.

Increased emphasis should be given to traffic planning and economics in the estimation of those at the conference. After review of the program of graduate training of the Bureau for Street Traffic Research, it was suggested that in order to provide for more student time in planning and economics that some reduction of effort in traffic devices and field work should be considered.

[1]. The Yale Bureau for Street Traffic Research will welcome communication with members of the I.T.E. regarding this matter.

It was further developed that there is a very great need for collection, analysis and syntheses of traffic engineering knowledge so as to provide a body of teaching and training material not only for graduate training but for all forms of training. Such material should serve to develop the *analytical* processes in dealing with highway traffic operation problems. This will require time and effort not only of teachers but of practicing engineers, many of whom are members of the Institute of Traffic Engineers.

In-Service Training. Consideration was given to the problems of training men, now engaged in active engineering work, such as those in allied engineering fields, who wish to develop themselves in traffic operations, and those now practicing traffic engineering work and who wish to develop their abilities further in traffic.

Attention was given to a review of short course training designed for the former group with which there has been accumulated considerable experiences. It was agreed that short courses of this type were valuable and should be encouraged but that several major changes were advisable.

Greater emphasis should be given in the future conduct of courses to educational rather than promotional effects.

Courses should be designed to draw out the thinking of individual students and gain their participation by intensive seminar discussion. Specific problems of individual students should be uncovered by previous contact with them. The extent of subject matter to be covered at any one course is thereby limited.

Subject matter should be presented on basis of known factual material from a scientific viewpoint of "good" and "bad".

Emphasis should be given to urban and suburban traffic problems

rather than state-rural conditions. To this end, interest of city engineering and police departments is to be solicited.

Short courses for state highway department personnel can best be developed by a joint working relationship of the I.T.E. and A.A.-S.H.O. To this end, the I.T.E. should consider the preparation of a rather complete specification for short in-service training for men not previously schooled in traffic engineering. Such specification may well contain specific aid procedures, manual of training, and similar items. Short courses for state highway groups can be better undertaken through initiative and guidance of the state highway department.

When attention of the conference was turned to the matter of short courses for practicing traffic engineers, it was felt that there is a real need for short course presentation and discussion of material at a professional level on such subjects as Planning and Economics and other matters on the frontier of the traffic engineers field of knowledge.

Sectional Meetings Proposed. The conference agreed that the time was ripe for development of sectional meetings of the I.T.E. This should be given full consideration by the Institute that such sectional meetings be properly planned and conducted and aimed at advancing the practicing traffic engineer's knowledge. New York, Washington, D. C., Chicago, and the Pacific coast were mentioned as centers which could develop worthwhile sectional meetings on a monthly or quarterly basis.

Selected Reading Lists. Many members of the traffic engineering profession wish to increase their knowledge in highway transportation and would therefore make good use of a list of selected readings classified as to the main branches of traffic engineering and selected fields.

This will require a periodic review of literature in the field, preparation of a resumé of such literature, the investigation and writing of current developments, the establishment of a central clearing house of information and a depository for library materials open by mail or on call to the members of the Institute of Traffic Engineers.

The Institute of Traffic Engineers was requested, in conjunction with the Yale Bureau for Street Traffic Research, to give this matter full consideration to the end that these services may be made available to individual members of the profession and that there may be established an official clearing house of published materials.

Conclusion

Throughout the conference the following thoughts dominated the discussion:

The traffic engineering profession has in the past held too narrow a view in the significance and application of highway operational values. It was generally felt that those who study and work with the operation of traffic or highways can make real contributions to such fields as highway design, planning, and economics, as well as in the field of highway safety.

Because the profession has (as a group) been primarily concerned with safety in operation, it has inordinately developed its knowledge in this area when compared with development in other phases, such as highway design, planning and economic values in operation.

There was a further undercurrent of thinking that there must be a balance between promotional effort and technical development.

POST-WAR PLANS FOR TRAFFIC CONTROL

by J. CARL MCMONAGLE

THE State Highway Department has been formulating plans, for some years, for the improvement of Michigan's highway transportation system. Those plans are proving their soundness as they are used as the basis for construction to meet the emergency needs of war. We know that they will be equally useful in developing the highway phase of the new world which the "Cease firing" signal will usher in.

The Department's master plan has evolved from the application of the data and methods developed by the Highway Planning Survey to Michigan's problems of highway transportation. The ultimate system which will result is aimed to meet the widely differing needs of the different parts of the state.

The principal elements of the rural system will consist of expressways, dual highways, and 2-lane highways of various types.

The expressways will be built on the heavy traffic routes of the interregional system. Like all highways planned for large volumes of traffic, they will have separate roadways for travel in each direction. Their characteristic features are that they will be routed directly between important terminals, access to them will be limited to a comparatively few points where significant quantities of traffic are to be gathered or discharged, and the grades of all intersecting traffic lines will be separated.

Dual highways of efficient design are to be built on all important routes whose traffic is beyond the capacity of 2-lane pavements and whose usage for short-trip transportation makes limited access impractical and unnecessary.

There will be two general classes of 2-lane trunklines. The major 2-lane highways will be developed on routes whose intrinsic importance for transportation is like that of the dual highways but whose traffic load is less. Design standards on these roads will be high and specifications call for the best types of concrete pavement. The minor 2-lane highways will be built on the secondary routes of the system. Their design and construction standards will be more modest than those of the major roads, but they will be high in comparison with the practice of the past.

Plans for the improvement of highway transportation facilities in cities cannot be generalized like those for the rural parts of the system. They must be made to fit the needs of each community and they will usually have to be integrated with a community program of rehabilitation. Studies of these conditions in a number of cities have been made and, in the case of Detroit, specific plans have been developed. In other cases planning and surveys are under way.

But with all the knowledge, skill, and ingenuity that highway design engineers have accumulated, it is not possible to plan roadways that are either automatic or fool-proof in their handling of traffic. Even the best drivers will need direction and warning and there will still be large numbers of motorists who will classify far below the best.

If the post-war highways proposed in the master plan are to be used efficiently and safely, a plan of traffic control applicable to each type of highway must be developed.

The possibility of conflicts between opposing and intersecting traffic streams is eliminated by the expressway type of design. Nevertheless, ex-

pressways will require guide and information signs and pavement markings. The signs must be large so that their message shall be legible at the higher speeds for which these roadways are designed, and both signs and markings should be reflectorized. In addition, all expressways should be delineated and, where volumes of traffic or number of pedestrians warrant, they should be lighted. Spot location lighting may be used effectively to illuminate points where special care is required.

Traffic on dual highways will need all types of control and protection except that their divided roadways make unnecessary the establishment of No Passing zones. In like manner, there will be no call for parking control in those sections where roadside businesses are prohibited. The higher speeds which may be expected to prevail on the post-war highways, however, will require that all needed types of control shall be applied with the greatest skill and care.

That is particularly true in relation to the 2-lane highways. On the major trunklines of this class, every device of routing, designing, and construction will be used to build suitable roads for rapid travel. Although curves will be superelevated, and horizontal and vertical curvature will be held to strict minimum, they will still be 2-lane roadways carrying traffic traveling at high speed in opposing directions.

It is clear that the best techniques of control and protection must be employed to assure the safest possible usage of these modern highways. Signs that can be read under these conditions, signals designed for maximum visibility and timed for minimum delays, reflectorized pavement markings, and a generous utilization of delineation will all be required. Special emphasis will have to be placed on parking and pedestrian control. Speed regulation will call for careful study in order that it shall not unnecessarily limit the advantages, which the roads were built to supply.

Lastly, it must be remembered that even when we are far into the post-war period there will necessarily remain in service many miles of present highways and streets which do not exemplify the modern elements of highway design and construction. A very great need will exist for comprehensive plans for improving the use of the arteries which will remain unchanged or which may have to be reconstructed on their present route and pattern. This will be particularly required in the case of the many important urban streets which will long remain in approximately their present condition as far as design and dimensions are concerned.

Preparing a Control Program

It is clear that much needs to be done to prepare the needed aids and safeguards for traffic on our post-war highways. If this program is to be effective, the work of setting it up and getting it in motion should be undertaken at once.

Possibly most important of the responsibilities involved, is directing engineering attention to the traffic and safety angles of the new highways which are being designed for construction early in the post-war period. Traffic engineers should review all plans prepared by the Road Division. Their review should be directed to all design features affecting the movement and safety of traffic. At the same time consideration must be given to the requirements for traffic control devices and regulatory measures which are indicated.

Also necessary is a thorough inventory of existing streets and highways to determine the number and location of signs, signals, speed and parking control zones, schools and school crossings, high accident locations, and trunkline routings in urban areas. Such

an inventory is now in progress in Michigan and our study of traffic control lights, which was undertaken as a war economy measure, is being carried on in connection with it.

The new features of design which are already being initiated and the greater demands which post-war traffic will impose on the existing highways require that every means be studied and used to provide efficient, safe, and expeditious traffic use of those facilities. In the State Highway Department it is expected that these studies will result in the establishment of new standards for signs and signals and in the preparation of manuals of uniform design and installation.

Special investigations are needed of traffic movements on the interchange roadways at separation structures and on intersections at grade. Equal emphasis should be given to studies of the effect driveways opening on trunkline pavements have on the flow and safety of through traffic. Findings regarding the highway design features that are required to accommodate and protect traffic at these locations should be incorporated in a Traffic Design Manual.

New Factors Affecting Traffic Control Methods

The need for fresh studies in the field of traffic control is evident when the changes in the conditions with which control must deal are considered. There is every reason to believe that these changes will affect almost all types of regulatory devices and techniques.

Signs

Existing standards and manuals for the design of signs are not based on the conditions which may be expected in the period when highways will again come into full normal useage. They must be revised and improved so that they will be effective in directing and warning traffic traveling at the higher speeds which are expected to be common in the post-war era. What the future speed rates may be is indicated by the fact that the state's most modern major highway, the rural sections of the Detroit Industrial Expressway, has a design speed of 100 miles per hour.

Progressively higher speeds and fairly static human perceptive ability and reactions dictate that the size of signs must be increased. On roadways where speeds of from 80 to 100 miles per hour will be possible, not only must the sign itself be larger, but its message must be spelled out in letters of proportionately greater size.

The factors upon which sign size is based are:

1. Legibility distance, or the distance at which the average driver can read them;
2. Warning distance, or the distance in advance of the location at which warning should be given;
3. Reading time, or the time required by the driver traveling at design speed to read the message from the moment he sights the sign to the moment he passes it;
4. Reaction time, or the length of the lag between reading and acting upon the message; and,
5. Deceleration or braking distance, that is, the distance to stop a vehicle traveling at design speed.

The 48" x 48" signs which are now called "over-size", will become standard for the trunkline system. They will carry letters ranging from 12 to 24 inches in height. Increased legibility distance, the greater attention and target value, and the fact that the larger size permits use of bigger reflector units, are among the advantages of increasing sign and lettering dimensions.

In the installation of directional and control signs made on the Willow Run Expressway System, 12-inch letters

were used. But larger size is only one approach to the problem of gaining greater legibility. It is believed that both appearance and readability can be increased by changing the form of the letters. For example, rounded characters will be given a trial. Then, too, a more generous spacing between the letters in legend signs should facilitate rapid and accurate reading.

To extend the usefulness of signs into the night hours, various methods of illumination have been developed in the last few years. The most common method is reflectorization by means of beaded material or other elements which reflect the beams from the headlights of approaching vehicles. Unquestionably, considerable improvements can be obtained in the properties and application of these materials.

While exterior lighting of signs is more expensive than reflectorization, it will probably be used more extensively than in the past. It has special advantages in heightening the visibility of signs which are placed overhead or which are located in lighted areas.

The effectiveness of a sign depends to a great extent on its location in respect to the traveled way and on the character of the area in which it is used. New standards for sign installation will be required for both urban and rural areas. On urban streets all signs will be placed higher than at present in order that they shall not be blanketed by parked cars and other obstacles. Span wires or mast arms will be used to suspend signs over the roadways of urban intersections. Whether in rural or urban sections, directional and warning signs should be placed far enough in advance of an intersection to give time to prepare for necessary turning or other maneuvers. At the intersection itself confirming signs will eliminate indecision and confusion.

War shortages and the necessity to find substitutes has led to the development or discovery of several new materials very useful for the construction of signs. Some of these are light steel, plastics, vedol plywood, and various forms of pressed wood.

Pavement Markings

Many of the same considerations which necessitate making signs visible in darkness, argue for a similar treatment of pavement markings. This is particularly valuable in the case of centerlines, lane lines, stop lines, cross walks, and the lines at the limits of "No Passing" zones.

In the past reflectorization of pavement markings has been accomplished by floating beaded material on the freshly applied paint. Experimental use of colored lane markings to guide traffic at Willow Run during the construction period points to the possibility of using reflecting material of various colors to guide traffic through municipalities at night. The possibility will be investigated.

Delineators

Testimony of drivers is almost unanimous that the highway delineators installed on several Michigan routes make night driving much easier. Careful investigation has proved that these devices actually reduce the rate of accident occurrence during the hours of darkness.

On the basis of this experience, all major trunklines will be equipped with continuous delineation and on the minor state highways, spot delineation will outline curves, bridges, and other potential accident locations.

Signals

A careful check of all signal installations on the trunkline system is now being made to determine which signals are warranted on the basis of the present reduced wartime traffic. It is probable that this check will disclose a considerable number of installations which are not required even under normal traffic conditions. When wartime

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restrictions are lifted, only those signals will be put back into operation which are found to be actually warranted.

In preparing the post-war signal program, careful attention will be given to certain factors significant to their usefulness. It goes without saying that signs should be so placed as to obtain maximum visibility—in locations where the driver will not have to look for them. Those signals controlling vehicular traffic will be installed on mast arms or span wires within the driver's range of vision. Pedestrian control signals will be placed on posts in direct line with the sidewalks.

Whether the size of traffic signal lenses should be increased or whether the number of lenses for each movement should be two or three, has not been definitely determined. We do know, however, that the benefits derived from installing two faces for each traffic stream justify the additional cost. It is safe to say that this type of unit will be specified in the post-war plans for new installations and for the modernization of existing signals.

These plans will also provide for a much more stringent schedule for checking the timing of all traffic control signals. This schedule will result in a practically continuous check and timing program. In the case of fixed time signals, program timers will be installed which will provide for much greater flexibility with the result that the Stop and Go alternations will fit as closely as possible the actual needs as indicated by the variations in traffic flow.

Lighting

There are, generally speaking, two broad types of highway lighting — continuous route lighting and spot location lighting. The criteria exist for setting up the warrants for these two types in the post-war program.

Continuous lighting will be installed on all expressways in or near urban areas and on other trunklines where significant numbers of pedestrians have access to the roadways.

Spot location lighting will be used to illuminate rural intersections, bridges, curves, and other roadway sections where conditions call for caution or a special maneuver on the part of the driver.

Consideration will be given to the possibility of using lights of different kinds and colors to designate specific types of highway locations and conditions. For example, sodium vapor lights may be used as the distinctive type of illumination for intersections at grade.

Parking Control

No problem related to the proper and efficient use of highways is more important or difficult of solution than parking. The temporary storage of vehicles at stopping places en route at the terminals of trips is an essential part of motor transportation. But facilities for such storage must be found and provided somewhere outside the highway's traveled way unless the facilities provided for transportation travel are to continue to be misused and made inefficient and dangerous for the service for which they were built.

The limited access feature obviates the reasons for stopping along the roadway except in case of emergency. Thus the parking problem does not exist in connection with this modern type of arteries.

On existing roadways which remain unchanged and on the new post-war roads where business establishments are permitted direct access, it will be necessary to set up definite and rigidly enforced parking control zones. Such business as liquor establishments, roadside restaurants, and roadside stands of various kinds, must provide parking areas with controlled ingress to and egress from the highway.

The parking problem has its most critical significance in urban areas. The

provision of parking space is a need which exists in every city and town, regardless of size; it varies only in degree. And if the need is to be met, it must be from the standpoint that control and regulation of curb parking is not all that needs to be done and that it is not a final solution.

Off-street parking facilities must be provided in urban centers of concentration as a preliminary to or, at least, as a part of any program of traffic improvement. Terminals where vehicles may be stored for various periods of time are just as essential as the roadways on which the vehicles travel. It can be demonstrated mathematically that it is more economical to provide off-street parking space than it is to build additional pavement widths to be used for car storage.

The necessity for and the benefits to be derived from a sound solution of the parking problem assure that projects providing off-street parking areas will be included in the post-war highway program. Plans for these projects will include, in addition to technical details, methods of promotion, financing, etc.

One very obvious method of securing funds for land purchase and construction costs in connection with these off-street parking projects would be to apply the proceeds from parking meters to this purpose. The only function which the meters perform is that of making it easier for the enforcement officials to enforce parking regulations whose object is a turn-over of vehicle spaces.

No one can reasonably controvert the fairness of a system which would devote the motorist's meter contributions to the provision of better parking facilities and to freeing the highway pavement, for which the motorist has already been taxed, from obstacles to its efficient use as a transportation artery.

Those responsible for the control and improvement of traffic will never catch up with the parking problem unless they attack it where it begins. In other words, legislation must be obtained requiring new business establishments to provide adequate off-street parking space for all their patrons. The initiation of such legislation is a part of the post-war traffic improvement plan. Of course the plan should include means for exerting pressure on existing business places to assume some part of the burden of correcting conditions in the areas where curb parking is already established.

Other Urban Control Problems

While the post-war highway program calls for the construction of many expressways to carry traffic around and through the urban areas of congestion, there will remain thousands of miles of existing city streets which will remain unchanged and which must serve large volumes of traffic. The use of these streets must be controlled and improved to hold congestion and accidents to a minimum.

The task of regulating the use of these streets so that they will be able to perform their essential function is of such magnitude that it merits special attention. In much of this work, the State Highway Department cannot, because of jurisdictional and financial limitations, be the primary agent. But is is a part of its post-war plan to provide an advisory and consultative service which will be helpful in the effective utilization and integration of the resources and facilities of the city and the state.

There is a wide field for urban street traffic improvement. The traffic control program must attack all angles of the problem of promoting improved use of the streets. It will include, in addition, to provision of better parking service, reinvestigation of through street systems and the establishment of systems of one-way streets. In con-

nection with these undertakings, routes will be determined for trucks and buses and for through traffic into and by-passing the business district.

Other phases of traffic control will include determining and regulating the speed of traffic, improving sign and signal application, and establishing limited ways at grade. A broader approach to traffic relief will come through programs for staggering the scheduled movements of industry, commerce, and social, educational and recreational activities. Special emphasis will be given to the problems of safeguarding school children in traffic.

Conclusion

This paper has been limited to a discussion of what it is proposed to do about traffic control and regulation in the post-war period. Traffic engineering is today taking the fullest advantage of studies in the fields of visual perception, driver psychology, traffic behavior, pavement capacity, urban planning, and the social sciences. Aided by these findings, the traffic engineers are devising ingenious and efficient methods of guiding traffic and improving the effectiveness of street and highway usage.

The post-war traffic control program will be a significant part of the contribution which highway improvement will make to the transportation phase of the higher and more efficient living standards of the future.

A digest of a paper by J. Carl McMonagle, Planning and Traffic Engineer, Michigan State Highway Department.

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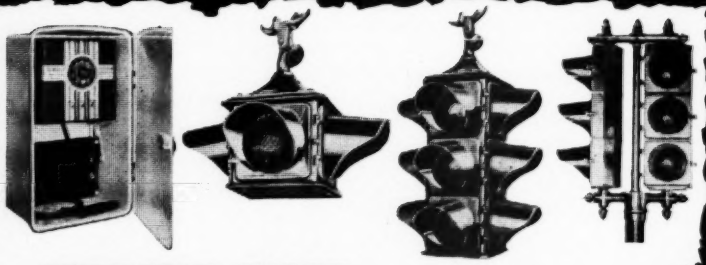

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EFFECTS OF WAR ON STATE HIGHWAY PROGRAMS

by M. J. HOFFMANN

ALL states have keenly experienced the effects of war-restricted construction as well as reduction in maintenance and other normally necessary activities. They have lost key personnel and large numbers of skilled and technical employees. All the states face perplexing uncertainties as to future highway revenues.

Some of these problems deal with internal questions which must be decided within our own states, and others revolve about issues which disturb normal relationships between the state and federal governments.

I recognize distinct trends:

1. Efforts within the states to reduce motor vehicle license fees and gas tax rates, on the ground that highway revenues exceed immediate needs;

2. Movements to suspend, in whole or in part, state license fees of motorists who lay up their cars for definite periods of time;

3. Attempts at further diversion of highway funds or cancellation or federal aid authorizations;

4. Postwar efforts to discard or disrupt long-proven principles of federal highway assistance; and

5. Efforts to continue indefinitely in the hands of federal agencies expansive emergency powers now temporarily exercised over state highway affairs.

Every highway administrator knows that any so-called surpluses reflected in recent or current highway balances are purely temporary in nature, and not really surpluses at all in the true sense of the word.

In Minnesota we are obliged to meet bonded debt charges of approximately $4,500,000 a year, including interest. All accruing revenues not immediately needed for this and other essential requirements are, in accordance with the policy laid down nearly a year ago by

Governor Harold E. Stassen, being placed in a postwar highway construction reserve fund.

In expectancy of early legislative authorization, we propose to invest some $10,000,000 of such funds and other balances in short-term federal securities. In the case of a long drawn out war, however, neither we in Minnesota nor the highway administrators of any other state, have any assurance that we may not have to reach deeply into such reserve funds, in order to meet operating necessities. The preservation of investments already made in highways requires the continuation of many essential maintenance operations.

Weather will continue to take its toll whether traffic volume is light or heavy.

In case No. 2, a motor vehicle, whether in use or in storage, constitutes property and as such has taxable value. For the public good, and consistent with the basic theories of taxation, it should be assessed either as a motor vehicle or as personal property. If these roads are to be preserved for the motorists' future use, their upkeep must be continued, and this means continuing maintenance costs.

The third trend is perhaps the most persistent obstacle to planned highway progress—diversion of highway funds to non-highway purposes.

Minnesota in 1921 joined the lead by writing into its constitution the proviso that monies collected for highway taxes could not be diverted to other purposes.

While the federal government has done the states real service by discouraging diversion it has by no means practiced what it preached, even in the prewar peace-time stewardship of its own road-user tax revenues. In Washington the suggestion has already been made, for what actually would constitute further diversion on the part of the federal government—the cancellation of federal aid authorizations already made.

Just as sure as the states will vitally need every dollar of their own funds they have been able to accumulate for the postwar construction program, so too will they have equally urgent need for every dollar of the unexpended federal balances which now stand to their credit.

The fourth trend has nothing to do either with state revenues, or funds in postwar reserves, or allotment credits on the federal aid books. But it is just as vital to the future of highway progress. Particularly in danger is the well-established formula for federal aid allotments.

The Public Roads Administration, in the past, has been the primary federal agency dealing with the states on highway matters. It has accomplished an outstanding job throughout these years—in fact so outstanding that we as highway administrators must insist upon the restoration, when the emergency ends, of the former powers exercised by this agency.

The final trend is one that was sounded by a series of measures which recently came before Congress, such as the Wheeler-Lea Bill (S-2015) for federal regulation of interstate highway commerce, and the Tax Exemption Bill (H. R. 6750) which would have nullified state and local tax powers, over equipment used in defense construction or transportation.

These measures and others like them should warn us to be ready for their reappearance in Congress when the war is over. The specific measures I refer to have been shelved temporarily, but they cast before them the ominous shadow of divers federal encroachment upon sovereign state rights.

Summary of an address by M. J. Hoffmann, Commissioner, Minnesota State Highway Department, before Annual Convention of American Association of State Highway Officials.